U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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June 13, 2007

SUMMARY OF SUBJECT MATTER

TO: Members of the Committee on Transportation and Infrastructure

FROM: Committee on Transportation and Infrastructure Staff

SUBJECT: Committee on Transportation and Infrastructure Markup of H.R. 2095, the Federal Railroad Safety Improvement Act of 2007, and H.R. ____, Transportation Energy Security and Climate Change Mitigation Act of 2007

PURPOSE OF MARKUP

On Thursday, June 14, 2007, at 3:00 p.m., in Room 2167 Rayburn House Office Building, the Committee on Transportation and Infrastructure will mark up H.R. 2095, the Federal Railroad Safety Improvement Act of 2007, and H.R. ____, Transportation Energy Security and Climate Change Mitigation Act of 2007.

H.R. 2095, THE FEDERAL RAILROAD SAFETY IMPROVEMENT ACT OF 2007

Background

The Federal Railroad Administration ("FRA") administers the Federal rail safety program. According to the FRA, there were a total of 13,046 accidents and incidents involving railroads in 2006. This total is comprised of three categories: train accidents, including collisions and derailments; grade-crossing accidents; and other incidents, which is defined as any event that caused a death, an injury, or an occupational illness to a railroad employee.

Since the FRA was last reauthorized in 1994, the total number of train accidents, including collisions and derailments, increased from 2,504 in 1994 to 3,325 in 2005. In 2006, the number of train accidents decreased to 2,835. According to the FRA, the two leading causes of all train accidents are human factors and track defects. In 2006, 1,017 accidents were caused by human factors and 1,032 accidents were caused by track defects. It was the first time that track defects

surpassed human factors as the top cause of all train accidents since 2001. *See Attachment 1 for additional background information on rail safety.*

H.R. 2095, the Federal Railroad Safety Improvement Act of 2007

H.R. 2095 reorganizes the FRA as the Federal Railroad Safety Administration, and ensures that it will consider the assignment and maintenance of safety as its highest priority. It also creates a new position at the FRA, entitled Chief Safety Officer, who is appointed in the competitive service by the Secretary of Transportation.

The bill requires the Secretary to develop a long-term strategy for improving railroad safety, which must include a plan and schedule for reducing the number and rates of accidents, injuries, and fatalities involving railroads; improving the consistency and effectiveness of enforcement and compliance programs; identifying and targeting enforcement at, and safety improvements to, high-risk grade crossings; and improving research efforts to enhance and promote railroad safety and performance. The Department of Transportation ("DOT") Inspector General is required to submit a report to Congress, which lists each statutory mandate regarding railroad safety that has not been implemented and each open safety recommendation made by the National Transportation Safety Board ("NTSB") or the Inspector General regarding railroad safety. The Secretary is then required to transmit periodic progress reports to Congress on the specific actions taken to implement each statutory mandate and open safety recommendation.

H.R. 2095 seeks to help prevent accidents caused by human factors, which account for about 40 percent of all accidents, by strengthening the hours-of-service law for signalmen and train crews, increasing worker training and qualifications, and implementing advanced safety technologies. Specifically, the bill ensures that train crews and signalmen are provided with a minimum of 10 consecutive hours of rest after 12 consecutive hours on-duty and at least 24 consecutive hours of additional rest within a seven-day work period; reduces the number of days signalmen can exceed their maximum limits on hours-of-service for emergencies to no more than three days in a seven-day work period (consistent with dispatcher limits for emergencies); prevents railroads from forcing signalmen into emergency time (a total of 16 hours on-duty) for routine repairs, maintenance, and inspection of signal systems; prohibits railroads from communicating with signalmen and train crews during their off-duty time to enable them to obtain adequate rest; prohibits railroads from providing sleeping quarters in an area or in the immediate vicinity of an area in which railroad switching or humping operations are performed; requires railroads to submit to the Secretary for review and approval fatigue management plans; and authorizes the Secretary to strengthen hours-of-service regulations, based on scientific and medical research, to improve safety.

With respect to "limbo time" for train crews, H.R. 2095 provides that time in "limbo" must be completed within the train crews' 12-hour on-duty limits, with some exceptions. Train crews are allowed to be in "limbo" for an unlimited amount of time when any of the following occurs: a casualty, an accident, an act of God, including a weather event such as a snowstorm, landslide, or track or bridge washout, a track obstruction, a derailment, a major equipment failure, or any other delay that was unforeseen or unknown to the railroad carrier when the employee left a terminal. Railroads are required to report to the FRA on their usage of limbo time, and they are required to provide train crews in limbo with equal, additional time for rest.

H.R. 2095 also requires railroads to develop and submit to the Secretary a plan for implementing a positive train control system by December 31, 2014, and to either install automatic switch position indicators in non-signaled territory or slow trains in non-signaled territory to enable a train to stop in advance of a misaligned switch. The Secretary of Transportation is authorized to extend the deadline for implementation of positive train control for any railroad carrier, upon notice in the Federal Register, for up to 24 additional months if the Secretary determines that such an extension is necessary to implement a more effective positive train control system, to obtain interoperability between positive train control systems implemented by railroad carriers, to determine that a positive train control system meets existing regulations, or to otherwise enhance safety.

H.R. 2095 addresses accidents caused by track defects, the leading cause of all train accidents in 2006, by requiring the railroads to manage the rail in their tracks to minimize accidents due to internal rail flaws. It also requires the Secretary to develop standards for concrete rail ties and to purchase six Gage Restraint Measurement System vehicles and five track geometry vehicles to enable the deployment of one Gage Restraint Measurement System vehicle and one track geometry vehicle in each region. This funding will help increase inspection of railroad track for defects.

The bill strengthens safety at our nation's grade crossings by requiring railroads to establish, maintain, and post a toll-free number at all grade crossings to receive calls reporting malfunctions of signals, crossing gates, and other devices, or disabled vehicles blocking such crossings. It requires the Secretary to prescribe regulations requiring railroads to remove and maintain clear from its right-of-way at all grade crossings all vegetation that may obstruct the view of pedestrians and motor vehicle operators. The bill also requires the Secretary to develop model legislation for State and local governments to establish civil or criminal penalties, or both, for violations of grade crossings and to address sight obstructions such as permanent structures at grade crossings; requires railroads and States to report information on grade crossings to enable the Secretary to update its national crossing inventory and help states determine where best to dedicate their resources for crossing improvements; requires the FRA to conduct an audit of each Class I railroad at least once every two years and each non-Class I railroad at least once every five years to ensure that all grade crossing collisions and fatalities are reported to the national accident database, as recommended by the DOT's Inspector General; requires the Secretary to identify the top 10 States with the most grade crossing collisions and work with them to develop State Grade Crossing Action Plans; and authorizes $1.5 million for Operation Lifesaver.

H.R. 2095 strengthens enforcement by increasing civil and criminal penalties; increasing transparency of all enforcement actions taken by the FRA; providing the Secretary with the authority to monitor and record railroad radio communications for the purpose of accident prevention and mitigations; and to increase the number of Federal railroad safety inspectors by about 100 inspectors per year for a total of at least 800 Federal railroad safety inspectors by the end of fiscal year 2011. There are currently 421 Federal rail safety inspectors and 160 State inspectors.

The bill strengthens whistleblower protections for rail workers and makes it unlawful to knowingly interfere, obstruct, or hamper an investigation by the Secretary or the NTSB. It requires railroads to provide rail workers with immediate medical attention when the workers are injured on the job, and provides all crewmembers with emergency escape breathing apparatus on freight trains carrying hazardous materials that would pose an inhalation hazard in the event of unintentional

release. H.R. 2095 also contains the Rail Passenger Disaster Family Assistance Act, as reported by the Committee on Transportation and Infrastructure and passed by the House in the 108th Congress.

Prior Legislative and Oversight Activities

The FRA was last reauthorized by Congress in 1994, in the Federal Railroad Safety Authorization Act of 1994. That authorization expired in 1998. Since 1994, the Subcommittee has held 22 hearings on rail safety.

In the 110th Congress, the Subcommittee on Railroads, Pipelines, and Hazardous Materials has held five hearings on rail safety. On January 30 and 31, 2007, the Subcommittee held hearings on reauthorization of the Federal rail safety program. On February 13, 2007, the Subcommittee held a hearing on fatigue. On March 16, 2007, the Subcommittee held a field hearing on the role of human factors in rail accidents. On May 1, 2007, Chairman Oberstar introduced H.R. 2095, the "Federal Railroad Safety Improvement Act of 2007". On May 8, the Subcommittee held a hearing on rail safety legislation, including H.R. 2095.

On May 22, 2007, the Subcommittee on Railroads, Pipelines, and Hazardous Materials met to consider H.R. 2095. The Subcommittee adopted, by voice vote, the following amendments:

- to require the Secretary to develop and make available to States model legislation addressing sight obstructions at grade crossings;
- to limit the scope of fatigue management plans submitted by railroad carriers to employees performing safety sensitive functions;
- to authorize $1.5 million for Operation Lifesaver to carry out a public information and education program to help prevent incidents at grade crossings and to use funds to implement a Railroad Safety Public Awareness pilot program in States and communities where safety is most at risk;
- to require the Secretary of Transportation to identify on an annual basis the top 10 States with the most grade crossing collisions and to work with those States to develop a State Grade Crossing Action Plan; and
- to require the Secretary to base efforts to strengthen hours of service standards on scientific and medical research; to allow the Secretary to extend the December 31, 2014 deadline for implementation of positive train control for any railroad carrier for up to 24 additional months if the Secretary determines that such an extension is necessary to implement a more effective positive train control system, to obtain interoperability between positive train control systems implemented by railroad carriers, to determine that a positive train control system meets existing regulations, or to otherwise enhance safety; to limit requirements that railroad carriers perform rail integrity inspections to manage an annual service failure rate of less than 0.1 per track mile to high-risk corridors, such as those that have significant movements of hazardous materials or where commuter and intercity passenger railroads operate; and to require railroads to transport workers who are injured on-the-job to the nearest hospital. The amendment also provided that time waiting for deadhead transportation and time in deadhead transportation from a duty assignment to the place of final release is neither time on-duty nor time off-duty in situations involving any of the following: a casualty, an accident, an act of God, including a weather event such as a snowstorm, landslide, or track or bridge washout, a track obstruction, a derailment, a major equipment failure, or any other delay that was unforeseen or unknown to the railroad carrier

when the employee left a terminal. The amendment requires railroads to report to the FRA on their usage of limbo time in these situations, and they are required to provide train crews in "limbo" with additional time for rest equal to the time spent in "limbo".

The Subcommittee favorably recommended H.R. 2095, as amended, to the Committee on Transportation and Infrastructure by voice vote with a quorum present.

Amendments

Chairman Oberstar will offer a manager's amendment to H.R. 2095.

Specific information on other amendments is not available at this time.

H.R. , THE TRANSPORTATION ENERGY SECURITY AND CLIMATE CHANGE MITIGATION ACT OF 2007

Background

In February 2007, the Intergovernmental Panel on Climate Change ("IPCC") declared that evidence of atmospheric warming is "unequivocal". The IPCC also stated with "very high confidence" that human activities have resulted in global warming. The results of this warming may result – and to a degree may already be resulting – in sea level rise, increased hurricane and storm activity, and changed precipitation patterns resulting in more frequent floods and droughts, among other impacts.

Observed and anticipated climate change impacts include: increased heat-related mortality; disturbed forests due to increased incidence of fire and pests; coastal flooding; rainfall and river runoff variability; declines in glacier and snowpack water storage; increased frequency of intense hurricanes; coastal wetlands loss; and animal and plant species extinction, among others.[1]

Although some climate change can occur as a function of natural variability, the IPCC notes that the warming that has occurred, and that which is expected to continue, is "*very likely* due to an observed increase in anthropogenic greenhouse gas concentrations" which are a result of human activities such as industrial processes, fossil fuel consumption, and changes in land use, such as deforestation. Human activities that emit greenhouse gases to the atmosphere increase the amount of heat that is absorbed before it could otherwise escape to space. Anthropogenic, or human, emissions of greenhouse gases enhance the atmosphere's natural insulating properties and result in global warming.

A variety of greenhouse gases play a role in atmospheric warming, but carbon dioxide is the most common and, according to the IPCC, "the most important anthropogenic greenhouse gas."[2] According to the IPCC, this "concentration of carbon dioxide in 2005 exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined by ice cores."[3] ***As a result of these increasing levels, the IPCC attributes carbon dioxide as accounting for approximately 80 percent of all observed global warming.***

Greenhouse gas emissions from the transportation sector are a major greenhouse gas source. According to the U.S. Environmental Protection Agency ("EPA"), 27.7 percent of the total greenhouse gas emissions produced in the U.S. come from the transportation sector, second only to electricity generation.

Buildings are also a major factor in the production of greenhouse gas emissions. According to the World Resources Institute, buildings account for 38 percent of carbon dioxide ("CO_2") emissions in the United States. According to the U.S. Green Building Council, buildings consume

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[1] The IPCC defines climate change as "any change in climate over time, whether due to natural variability or as a result of human activity."

[2] The other primary greenhouse gases are methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

[3] Prior to 1800, when fossil fuels, such as coal, began to be used on a widespread scale), there were roughly 280 parts per million (ppm) of CO_2 in the atmosphere. In 2005, 379 ppm of CO_2 were measured in the atmosphere.

70 percent of the electricity load in the United States and, over the next 25 years, CO_2 emissions from buildings are projected to grow faster than any other sector, with emissions from commercial buildings projected to grow the fastest at 1.8 percent a year through 2030. *See Attachment 2 for additional background information on climate change.*

H.R. ____, the Transportation Energy Security and Climate Change Mitigation Act of 2007

H.R. ____, the Transportation Energy Security and Climate Change Mitigation Act of 2007, strengthens our Nation's energy security and mitigates the effects of climate change by promoting energy efficient transportation and public buildings, creating incentives for the use of alternative fuel vehicles and renewable energy, and ensuring sound water resource and natural disaster preparedness planning. Specifically, the bill:

TITLE I – DEPARTMENT OF TRANSPORTATION

- ***Authorizes the Department of Transportation's Center for Climate Change and Environment.*** This section authorizes such sums as may be necessary to carry out the activities of the Center, which was established administratively in 1999. The Center will plan, coordinate, and implement department-wide research, strategies, and actions to reduce transportation-related energy use and mitigate the effects of climate change; and

- ***Establishes a Clearinghouse of Low-Cost Solutions to Reduce Transportation-related Energy Use and Mitigate the Effects of Climate Change.*** This section creates a Clearinghouse within the Center for Climate Change and Environment to identify and track low-cost solutions to reducing transportation-related energy use and greenhouse gas emissions.

TITLE II – HIGHWAYS AND TRANSIT

- ***Authorizes Capital and Operating Funds for Transit Agencies to Reduce Fares and Expand Transit Services.*** This section authorizes $850 million (General Fund) for each of fiscal years 2008 and 2009 to allow urban and rural transit agencies to reduce transit fares and expand transit services. These funds will allow transit agencies to provide incentives for commuters to choose transit options, thereby reducing our nation's transportation-related energy consumption and reliance on foreign oil, as well as decreasing its greenhouse gas emissions. Grants made under this program will have a 100 percent Federal share.

- ***Increases the Federal Share for Clean Fuel and Alternative Fuel Transit Bus, Ferry, or Locomotive-related equipment and Facilities from 90 percent to 100 percent.*** Under current law, the Federal share for the portion of transit buses, ferries, or locomotives that is for clean fuel or alternative fuel-related equipment or facilities for compliance with the Clean Air Act is 90 percent. This section increases the Federal share for the alternative fuel vehicle-related equipment from 90 percent to 100 percent of the net project cost for fiscal years 2008 and 2009.

- ***Establishes a Forum for the Resolution of Access Issues between Transit Agencies and Freight Railroads at the Surface Transportation Board.*** The majority of commuter rail systems use rights-of-way owned by private freight railroads for their operations. As the

level of freight traffic grows, public transportation authorities and freight railroads are finding it increasingly difficult to reach mutually satisfactory agreements regarding commuter rail service. The lack of a suitable forum for negotiating commuter rail agreements often has hindered vital public transportation services, thus it is critical that procedures be established to assure that both freight and passenger needs can be achieved in a way that is fair, timely and reasonable. This provision establishes the Surface Transportation Board as a forum at which either commuter or freight railroads may appeal for adjudication of access issues.

- ***Increases the Federal Share for the Congestion Mitigation and Air Quality Improvement ("CMAQ") Program from 80 percent to 100 percent.*** Under current law, the Federal share for CMAQ projects is 80 percent. This section increases the Federal share for CMAQ projects to 100 percent for fiscal years 2008 and 2009.

- ***Requires the Federal Highway Administration ("FHWA") to Distribute Rescissions of any Federal-aid Highway Program Contract Authority Proportionately among Core Highway Programs.*** Over the past five years, some State Departments of Transportation have applied contract authority rescissions disproportionately to the Congestion Mitigation and Air Quality Improvement and Transportation Enhancement programs, which provide significant environmental benefits. This section requires FHWA to apply contract authority rescissions proportionately among core highway programs.

- ***Includes a Sense of Congress Expressing Support for "Complete Streets" Policies when Roadways are Constructed or Rehabilitated.*** "Complete Streets" are those roadways designed to accommodate the needs of a variety of users, including motorists, transit riders, cyclists, pedestrians, and people of all ages and abilities. The implementation of Complete Streets policies can facilitate the use of environmentally-friendly transportation options such as public transit, walking, and bicycling.

<u>TITLE III – RAILROAD AND PIPELINE TRANSPORTATION</u>

- ***Establishes a Green Locomotive Grant Program.*** This section establishes a Green Locomotive grant program and authorizes $50 million for each of fiscal years 2008 through 2011 for grants to railroad carriers and State and local governments to purchase or recondition locomotives to exceed the Environmental Protection Agency's emission standards for locomotives and locomotive engines.

- ***Establishes a Capital Grants Program for Short-line and Regional Railroads.*** This section establishes a capital grant program for short-line and regional railroads to rehabilitate, preserve, and improve railroad track to handle 286,000-pound railroad cars. It authorizes $250 million for each of fiscal years 2008 through 2011 for such grants.

- ***Directs the Secretary of Energy and the Secretary of Transportation to Conduct Feasibility Studies for the Construction of Pipelines Dedicated to the Transportation of Ethanol.*** This section authorizes the Secretary of Energy, in coordination with the Secretary of Transportation, to conduct feasibility studies for the construction of pipelines dedicated to the transportation of ethanol. It authorizes $1 million for each of fiscal years 2008 and 2009 for such feasibility studies.

TITLE IV – MARITIME TRANSPORTATION

- ***Establishes a Short Sea Shipping Transportation Program to Mitigate Landside Congestion.*** The Secretary of Transportation is directed to designate short sea transportation routes and designate projects that will offer a waterborne alternative to available landside transportation services. The Secretary will then promote short sea transportation services on these routes with ports, States, and private sector entities. The Secretary of Transportation is authorized to make loan guarantees for the construction, reconstruction, or reconditioning of vessels that will be used for short sea transportation projects. The bill authorizes $25 million for each of fiscal years 2008 through 2011 for up to $2 billion of loan guarantees. The bill also expands the use of the Capital Construction Fund program to include short sea transportation routes in the coastwise trade to help promote financing of these vessels.

- ***Establishes a Green Ports Initiative to Promote the Development and Use of Technologies in U.S. Ports and Shipyards to Reduce Air Emissions.*** Under the program, the Secretary of Transportation may provide grants and low-cost revolving loans on a competitive basis to ports, terminal operators, and shipyards to achieve significant reductions in air emissions in U.S. ports. The section authorizes $25 million for each of fiscal years 2008 through 2011 for these grants and loans. In addition, the section authorizes the Secretary to establish a cooperative partnership with the Environmental Protection Agency ("EPA") Administrator to test emissions reduction technology on vessels. The section authorizes $6 million to carry out the cooperative partnership testing program.

- ***Implements Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL Convention) which Sets Limits on Nitrogen Oxide, Sulfur Oxide, and Volatile Organic Compound Emissions from Ship Exhausts and Prohibits Deliberate Emissions of Ozone- depleting Substances.*** This subtitle includes H.R. 802, the Maritime Pollution Prevention Act of 2007, as passed by the House on March 26, 2007. The subtitle requires the Coast Guard and EPA to prescribe regulations to implement vessel air emission standards and requirements for nitrogen oxides, sulfur oxides, and volatile organic compounds that are outlined under Annex VI of the MARPOL Convention.

TITLE V – AVIATION

- ***Establishes the CLEEN Engine and Airframe Technology Partnership.*** This section directs the Federal Aviation Administration ("FAA") to enter into a cooperative agreement with an institution, entity, or consortium to form a research group for the development, maturing and certification of continuous lower energy, emissions and noise (CLEEN) engine and airframe technology. The section authorizes $111 million for the cooperative agreement.

- ***Establishes an Airport Environmental Mitigation Pilot Program.*** This section establishes a pilot program to allow the FAA to fund six projects at public-use airports that would take promising environmental research concepts that have been proven in the laboratory into the actual airport environment for demonstration. Eligible projects would demonstrate whether research would measurably reduce or mitigate aviation impacts on noise, air quality or water quality in the airport environment. Grants will be awarded based

on the greatest reductions in aircraft noise, airport emissions, or water quality impacts. This section authorizes up to $2.5 million per project.

TITLE VI – PUBLIC BUILDINGS

- ***Requires the General Services Administration ("GSA") to Use Energy Efficient and Renewable Energy Systems in Federal Buildings.*** This section directs the Administrator of General Services to include in each prospectus for construction, alteration, or acquisition of any building, or space to be leased an estimate of the future energy performance of the building or space and a specific description of the use of energy efficient and renewable energy systems, including photovoltaic systems.

- ***Requires GSA to use Energy Efficient Light Bulbs and Fixtures.*** This section requires the Administrator of General Services to install energy efficient light bulbs and fixtures in Federal buildings when buildings are constructed, altered, or acquired. It also requires GSA to install energy efficient light bulbs and fixtures when light bulbs and fixtures are replaced in the normal course of maintenance of Federal buildings.

- ***Increases the Allowable Period for Utility Contracts from 10 to 30 years.*** This section allows the Administrator of General Services to sign utility contracts for up to 30 years if the longer contract period is cost effective and necessary to promote the use of energy efficient and renewable energy systems, including photovoltaic systems.

- ***Increases the Allowable Period for Life-Cycle Costs from 25 to 40 years.*** This section extends the life cycle cost calculation from 25 years to 40 years, thus enabling the cost of energy efficient systems to be amortized over a longer period of time.

- ***Directs the Administrator of General Services to Install a Photovoltaic Sunwall System at the Department of Energy Headquarters in Washington D.C.*** This section includes H.R. 798, as passed by the House on February 12, 2007. This section authorizes GSA to install a photovoltaic system for the Department of Energy headquarters building and directs GSA to use $30 million of unobligated balances from the Federal Buildings Fund to carry out the project.

- ***Prohibits the Coast Guard from Purchasing or Installing General Service Incandescent Light Bulbs in Coast Guard Facilities after January 1, 2009.*** This section prohibits the Coast Guard from purchasing or installing general service incandescent light bulbs in Coast Guard facilities. The section provides an exception for the Coast Guard use of incandescent light bulbs if the Commandant of the Coast Guard determines that operational requirements necessitate the use of such bulbs.

- ***Authorizes the Architect of the Capitol to Conduct a Feasibility Study Regarding the Construction of a Photovoltaic Roof for the Rayburn House Office Building.*** This section authorizes the Architect to conduct a feasibility study regarding construction of a photovoltaic roof for the Rayburn House Office Building and to report to the Committee on Transportation and Infrastructure on the results of the study and recommendations regarding such construction. The section authorizes such sums as may be necessary for the study.

- ***Authorizes the Architect of the Capitol to Construct an E-85 Fuel Tank and Pumping System for Legislative Branch Vehicles.*** This section authorizes the Architect to construct a fuel tank and pumping system for E-85 fuel at the Capitol Grounds Fuel Station. The E-85 fuel tank shall be available for use by all legislative branch vehicles. This section authorizes such sums as may be necessary for the project.

- ***Requires the Architect of the Capitol to Include Energy Efficiency and Climate Change Mitigation Measures in the Capitol Complex Master Plan.*** This section requires the Architect to include energy efficiency measures, climate change mitigation measures, and other appropriate environmental measures in the Capitol Complex Master Plan and to report to the House Committee on Transportation and Infrastructure and the Senate Committee on Rules on the measures included in the Master Plan.

TITLE VII – WATER RESOURCES & EMERGENCY MANAGEMENT

- ***Establishes the Policy of the United States for all Federal Water Resources Projects.*** This section establishes national policy regarding the construction and management of Federal water resource projects.

- ***Establishes the 21st Century Water Commission to Provide Expert Scientific Guidance on Future Water Supply and Demand Projections, Climate Change Impacts to our Nation's Flood Risk and Water Demand, and Associated Climate Change Impacts on Water Quality.*** This section creates a "21st Century Water Commission" to study current Federal, State, and local water resource management programs and activities, and to ensure that the Nation is adequately prepared to meet the water supply, water quality, and water resource demands of the next 50 years.

- ***Directs the U.S. Army Corps of Engineers to Study the Potential for Increased Hydropower at Existing U.S. Army Corps of Engineers Facilities.*** This section directs the Corps of Engineers to undertake a study of potential increased hydropower generating capabilities at existing Corps facilities.

- ***Directs the National Academy of Sciences to Study the Potential Impacts of Climate Change on Water Resources and Water Quality.*** This section directs the Administrator of the Environmental Protection Agency to enter into an arrangement with the National Academy of Sciences to study the potential effects of climate change on water quality, and to recommend appropriate responses to address potential impacts of climate change on water quality, watersheds, and water resources.

- ***Directs the U.S. Army Corps of Engineers to Study the Potential Impacts of Climate Change on Army Corps of Engineers Projects.*** This section directs the Secretary of the Army to ensure that all future water resources projects and studies take into account the potential short-term and long-term effects of climate change, and to report to the House and Senate authorizing committees with one year of the Corps implementation of this section.

- ***Directs the Federal Emergency Management Agency to Study the Increase in Demand for the Agency's Emergency Preparedness, Response, Recovery, and Mitigation Programs and Services Because of the Increased Number and Intensity of Natural Disasters Affected by Climate Change.***

Prior Legislative and Oversight Activities

On May 11, 2007, the Committee on Transportation and Infrastructure held a hearing on Administration proposals on climate change and energy security. Secretary of Transportation Mary E. Peters, Environmental Protection Agency Administrator Stephen Johnson, Assistant Secretary of the Army for Civil Works John Paul Woodley, Jr., and Administrator of General Services Lurita Alexis Doan testified on Administration proposals. In addition, Acting Architect of the Capitol Stephen T. Ayers and U.S. House of Representatives Daniel P. Beard testified on Legislative Branch activities on climate change and energy security.

On May 16, 2007, the Committee held a second Full Committee hearing and 20 witnesses testified regarding specific climate change and energy security issues in surface transportation, maritime transportation, aviation, public buildings, water resources, and emergency management.

On June 13, 2007, Chairman Oberstar introduced H.R. ____, the Transportation Energy Security and Climate Change Mitigation Act of 2007.

Amendments

Specific information on amendments is not available at this time.

RAIL SAFETY

This attachment provides additional background information on rail safety issues.

Human Factors Accidents

Human factors are responsible for nearly 40 percent of all train accidents, and the FRA reports that fatigue plays a role in approximately one out of four of those accidents. The NTSB's in-depth investigations of accidents have also demonstrated that fatigue is a major factor in transportation accidents. According to the NTSB, "the current railroad hours-of-service laws permit, and many railroad carriers require, the most burdensome fatigue-inducing work schedule of any federally-regulated transportation mode in this country."

A commercial airline pilot (part 121) can work up to 100 hours per month; a commercial airline pilot (part 135) can work up to 120 hours per month; shipboard personnel (ocean going) can work up to 360 hours per month; and a truck driver can be on-duty up to 350 hours per month. Meanwhile, train crews can operate a train up to 432 hours per month. That equates to more than 14 hours a day for each of those 30 days.

The NTSB has recommended on numerous occasions that the FRA establish within two years scientifically based hours-of-service regulations that set limits on hours-of-service, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements. However, the FRA is the only modal administration within DOT that has hours-of-service standards mandated by statute and, therefore, may not be adjusted or modified by administrative procedures.

The Hours of Service Act was first enacted in 1907; it was last substantially amended in 1969. Since that time, a number of serious train accidents have occurred as a result of operator fatigue. One of the issues of concern relating to fatigue is "limbo time". Limbo time is a term used to describe the period of time when a train operating crew's hours-of-service has expired, but the crew has not yet arrived at their point of final release; meaning, the off-duty location or terminal point where they can go home or obtain food and lodging at an away from home terminal. Limbo time also accrues for train operating crews whose trains are stopped on a line of track, frequently due to the expiration of their 12-hour on-duty time limit, before they reach their destination terminal (point of final release). Limbo time accrues for the time the train is stopped until the crew arrives at the final release point, and includes time spent in transportation to their final release point, as well as time spent waiting for transportation to pick them up from their train.

During limbo-time, crew members are required to stay awake, alert, and able to respond to any situation and follow the railroad's operating rules. Although current law does not classify limbo time as either on-duty or off-duty time, any required minimum rest period does not begin until the limbo time period ends. Limbo time can and has kept railroad operating crews effectively on-duty for significantly more than the 12-hour on-duty time limit. For instance, in a 2004 Macdona, Texas train accident, a Union Pacific ("UP") engineer worked for 22 hours (12 hours on-duty and 10 hours of limbo time).

As a result of that accident, the NTSB concluded, "The minimum rest periods prescribed by Federal regulations do not take into account either rotating work schedules or the accumulated hours spent working and in limbo time, both of which can affect the ability of an employee to obtain full rest and recuperation between job assignments." The NTSB recommended that the FRA require railroads to use scientifically based principles when assigning work schedules for train crew members, which consider factors that impact sleep needs, to reduce the effects of fatigue and establish requirements that limit train crewmember limbo time to address fatigue.

The NTSB also stated that it "remains concerned about the safety of railroad operations where backup systems are not available to intervene when, as in this accident, a train crew operates a train improperly or fails to comply with wayside signals. NTSB accident investigations over the past three decades have shown that the most effective way to prevent train-to-train collisions is through the use of a positive train control (PTC) system that will automatically assume some control of a train when the train crew does not comply with signal indications."

Over the years, the NTSB has issued a series of recommendations on PTC. In fact, PTC has remained on the Board's Most Wanted Transportation Safety Improvements list since 1990. The NTSB concluded that the Macdona, Texas, accident is "another in a long series of railroad accidents that could have been prevented had there been a PTC system in place at the accident location."

Track-related Accidents

In 2006, defective track was the leading cause of all train accidents. Prior to 2006, it was either the leading or second leading cause of all train accidents. A series of recent high-profile accidents have called into question the adequacy of track safety regulations, the railroads' track inspection and maintenance programs, and the FRA's oversight of those programs.

On March 12, 2007, a CSX train derailed in Oneida, New York. The cause was defective track. It was one of a series of accidents in Upstate New York, and the FRA launched a rail inspection project to check 1,300 miles of CSX track across New York State for flaws that might lead to a train derailment. On April 18, 2007, the FRA announced that it had found 78 track defects and one serious violation during the audit. The FRA's ongoing review of rail safety in New York has now been expanded to other railroads.

On April 3, 2005, a westbound Amtrak train derailed on BNSF's tracks in Home Valley, Washington. Thirty passengers sustained minor injuries; 14 of those people were taken to local hospitals. Track and equipment damages, in addition to clearing costs associated with the accident, totaled about $854,000. The NTSB determined that the cause of the accident was BNSF's inadequate response to multiple reports of rough track conditions that were subsequently attributed to excessive concrete crosstie abrasion, which allowed the outer rail to rotate outward and create a wide-gauge track condition. Contributing to the accident was the FRA's failure to provide adequate track safety standards for concrete crossties.

On April 6, 2004, an Amtrak train derailed on Canadian National-owned and maintained track near Flora, Mississippi. The entire train derailed, including one locomotive, one baggage car, and eight passenger cars. The derailment resulted in one fatality, three serious injuries, and 43 minor injuries. The equipment costs associated with the accident totaled about $7 million. In its Railroad Accident Report, the NTSB determined that the probable cause of the accident was "the failure of the Canadian National Railway Company to properly maintain and inspect its track, resulting in rail

shift and the subsequent derailment of the train, and the Federal Railroad Administration's ineffective oversight to ensure proper maintenance of the track by the railroad."

On October 16, 2004, a UP freight train derailed three locomotives and 11 cars near Pico Rivera, California. Small amounts of hazardous materials were released from the transported cargo. There were no injuries to area residents, the train crew, or the emergency response personnel. UP estimated the monetary damage at $2.7 million. In its Railroad Accident Brief, the NTSB determined "that the probable cause of the derailment was the failure of a pair of insulated joint bars due to fatigue cracking. Contributing to the accident was the lack of an adequate on-the-ground inspection program for identifying cracks in rail joint bars before they grow to critical size."

On January 18, 2002, a Canadian Pacific freight train derailed 31 of its 112 cars near Minot, North Dakota. Five tank cars carrying anhydrous ammonia, a liquefied compressed gas, catastrophically ruptured, and a vapor plume covered the derailment site and surrounding area. About 11,600 people that occupied the area were affected by the vapor plume. One resident was fatally injured, and 60 to 65 residents of the neighborhood nearest the derailment site were rescued. As a result of the accident, 11 people sustained serious injuries, and 322 people, including the two train crew members, sustained major injuries. Damages exceeded $2 million, and more than $8 million has been spent in environmental remediation.

In its Railroad Accident Report, the NTSB determined that the probable cause of the derailment was "an ineffective Canadian Pacific Railway inspection and maintenance program that did not identify and replace cracked joint bars before they completely fractured and led to the breaking of the rail at the joint." The NTSB also found that the FRA's requirements regarding rail joint bars in continuous welded rail ("CWR") were ineffective and that the FRA's oversight of Canadian Pacific's CWR program was ineffective, because the FRA neither reviewed the CWR program nor ensured that its track inspectors had copies of the CWR programs to determine if the railroad was in compliance with it.

On March 17, 2001, a westbound Amtrak train traveling on BNSF tracks derailed near Nodaway, Iowa. As a result of the derailment, one person died and 77 people were injured. The NTSB determined that the probable cause of the derailment of the Amtrak train was the failure of the rail beneath the train, due to undetected internal defects. BNSF had failed to inspect the rail that it used to replace a defective rail. The replacement rail was also defective. According to the NTSB, contributing to the accident was the BNSF's lack of a comprehensive method for ensuring that replacement rail is free from internal defects.

Grade-Crossing Accidents

There are 243,016 grade crossings in the United States, of which 149,628 or 62 percent are public crossings. Of these public crossings, 63,387 or 42 percent have automatic warning devices.

Since the FRA was reauthorized in 1994, significant progress has been made in reducing collisions and fatalities at grade crossings. From 1994 to 2006, total train miles traveled in the United States increased from 655 million miles to 810 million miles, and the total miles traveled by motor vehicle increased from 2.3 trillion miles to 2.9 trillion miles. During the same period, collisions at the nation's grade crossings have decreased from 4,979 in 1994 to 2,908 in 2006.

Fatalities have also decreased from 615 in 1994 to 366 in 2006, and injuries have decreased from 1,961 to 1,006 during the same period.

The DOT Inspector General reports that this significant decrease was attributable to the Department addressing much of the "low-hanging fruit", that is, working with the states and railroads to close grade crossings, install automatic gates and flashing lights at public crossings with a high probability for collisions, and educate the public about crossing safety. The Department also made progress in implementing safety initiatives included in its 1994 Grade Crossing Safety Action Plan.

Recent audit reports of the DOT Inspector General, however, show that the DOT can do more to improve grade crossing safety. The audits were requested by Chairman James L. Oberstar, Subcommittee on Railroads, Pipelines, and Hazardous Materials Chairwoman Corrine Brown, and former Senator Ernest Hollings in response to a series of *New York Times* articles that alleged problems with railroad accident reporting, investigations at grade crossings, and several other safety issues.

The DOT Inspector General found that railroads failed to report 21 percent of reportable grade-crossing collisions to the National Response Center ("NRC"). Railroads are required to report grade-crossing collisions involving fatalities and/or multiple injuries to passengers or train crew members, and fatalities to motorists or pedestrians involved in grade-crossing collisions to the NRC. Pursuant to FRA and NTSB regulations, railroads are required to report accidents within two hours. Immediate reporting allows the Federal Government to decide whether or not to conduct an investigation shortly after a grade-crossing collision has occurred. The DOT Inspector General's analysis showed that 115 of 543 (21 percent) reportable grade-crossing collisions that occurred between May 1, 2003, and December 31, 2004, were not reported to the NRC. Although the 115 unreported grade-crossing collisions, which resulted in 116 fatalities, were reported to the FRA within 30 to 60 days after the collision, as required, that was too late to allow Federal authorities to promptly decide whether or not to conduct an investigation. In July 2004, the FRA began reconciling its database with the NRC to identify unreported accidents. In March 2005, it began issuing findings of violations to railroads failing to follow reporting requirements.

The DOT Inspector General also found that the Federal Government investigated only a small number of grade-crossing collisions and needs to collect and analyze independent information on all grade-crossing collisions. From 2000 through 2004, FRA investigated 47 of 376 (13 percent) of the most serious grade-crossing collisions that occurred — those collisions resulting in three or more fatalities and/or severe injuries. No Federal investigations were conducted for the remaining 329 crossing collisions. Those collisions resulted in 159 fatalities and 1,024 injuries. FRA officials stated that the National Transportation Safety Board (NTSB) is the lead Federal agency responsible for investigating railroad accidents, not the FRA. However, the NTSB tends to investigate only high-profile, grade-crossing collisions. For example, from 2000 though 2004, the NTSB conducted seven grade-crossing collision investigations. Consequently, the Federal Government did not independently investigate most grade-crossing collisions, but rather received information concerning the causes of collisions almost exclusively from the railroads.

The railroads' grade-crossing accident reports attributed more than 90 percent of the collisions that occurred from 2000 through 2004 to motorists, but the FRA did not conduct its own investigations to verify the causes. Independently collecting and analyzing information about grade

crossing collisions would substantially improve the FRA's ability to determine the causes of grade-crossing collisions and better target collisions that should be investigated further. The collection and analysis of this information is especially important given the limited resources of the FRA's inspection staff. Nationwide, 55 of 421 FRA inspectors are assigned to inspect the 63,387 warning signal systems at grade crossings.

The small number of FRA inspectors combined with the extensiveness of the U.S. railroad system limits the FRA's ability to investigate each accident or incident and inspect each railroad and mile of track. In 2004, the Federal Aviation Administration ("FAA") conducted on-site investigations of 1,392, or 93 percent, of the 1,484 general aviation accidents that the FAA had responsibility for investigating in 2004. Unlike the FRA, however, the FAA has an Office of Accident Investigations staffed with eight full-time investigators whose mission is to detect unsafe conditions and trends and to coordinate the process for corrective actions. In addition, the FAA uses personnel from other disciplines to conduct investigations, including 2,989 inspectors from its Office of Aviation Safety.

The DOT Inspector General also found that the FRA investigated few accidents and recommended few findings of violations for critical safety defects identified through inspections. According to the Government Accountability Office, the FRA investigates two-tenths of one percent of all railroad operations. From 2002 through 2004, for example, FRA inspectors identified 7,490 critical safety defects out of 69,405 total safety defects related to automated grade crossing warning signals. Yet, FRA recommended only 347 critical defects, or about five percent, for findings of violations that carry a fine. According to the Inspector General, the FRA's policy of inspectors using their discretion in deciding whether to recommend a violation has resulted in a small number of critical defects recommended for violations. Furthermore, after violations are determined, Federal law allows the FRA to negotiate-down the amount of civil penalties proposed, resulting in the collection of lower penalties, despite the many critical safety defects found. According to the Inspector General, on average, the FRA settles fines with the railroad at about 60 cents on the dollar.

Finally, the Inspector General found that the FRA needed to do more to improve grade-crossing safety by addressing sight obstructions, including overgrown vegetation, that block highway users' view of approaching trains. Of the 15,416 grade-crossing reports submitted by the railroads from 2001 through 2005, 689 documented a sight obstruction. These 689 collisions resulted in 87 fatalities and 242 injuries.

Nationwide, there are nearly 76,000 public grade crossings that are not protected with automated warning devices. Currently, FRA regulations only require the railroads to address vegetation growth at these public grade crossings. Some states have passed more stringent laws or issued more stringent regulations that address vegetation and other sight obstructions at grade crossings. But the FRA has no assurance that overgrown vegetation and sight obstructions are addressed in states that lack such laws.

CLIMATE CHANGE

This attachment provides additional information on climate change.

Climate Change

In February 2007, the Intergovernmental Panel on Climate Change[4] (IPCC) declared that evidence of atmospheric warming is "unequivocal".[5] The IPCC also stated with "very high confidence"[6] that human activities have resulted in global warming. The results of this warming may result – and to a degree may already be resulting – in sea level rise, increased hurricane and storm activity, changed precipitation patterns resulting in more frequent floods and droughts, among other potential impacts.

The IPCC defines climate change as "any change in climate over time, whether due to natural variability or as a result of human activity."[7] While some climate change can occur as a function of natural variability, the IPCC notes that the warming that has occurred, and is expected to continue, is "*very likely* due to an observed increase in anthropogenic greenhouse gas concentrations"[8] which are a result of human activities such as industrial processes, fossil fuel consumption, and changes in land use, such as deforestation.[9]

Current and projected global warming occurs because of the "greenhouse effect." The greenhouse effect is a natural process in which the atmosphere absorbs heat – resulting in a warm and habitable earth. Specifically, visible sunlight passes through the atmosphere without being absorbed. Some of the sunlight that strikes the earth is absorbed and converted to heat, warming the surface. The surface then emits some of this heat back into the atmosphere where it is absorbed by greenhouse gases such as carbon dioxide (CO_2), methane, and nitrous oxides, among others. For the previous 10,000 years, the greenhouse effect has produced an average global temperature of 57 degrees Fahrenheit. The absence of greenhouse gases would result in an inhospitable planet unable to support most life forms with an average temperature well below freezing.

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[4] Recognizing the problem of potential global climate change, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988. It is open to all members of the UN and WMO. The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. The IPCC does not carry out research nor does it monitor climate related data or other relevant parameters. It bases its assessment mainly on peer reviewed and published scientific/technical literature. http://www.ipcc.ch/about/about.htm (accessed 9 May 2007)

[5] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.5

[6] The IPCC uses "the following levels of confidence…to express expert judgments on the correctness of the underlying science: *very high confidence* at least a 9 out of 10 chance of being correct; *high confidence* about an 8 out of 10 chance of being correct." IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.5.; Virtually certain >99% probability of occurrence, Extremely likely>95%, Very likely>90%, Likely>66%... *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.4.

[7] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.2

[8] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.10

[9] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.2

Human activities that emit greenhouse gases to the atmosphere increase the amount of heat that gets absorbed before it could otherwise escape into space. Anthropogenic, or human, emissions of greenhouse gases therefore enhance the natural greenhouse effect and cause global warming.

It is without question that global warming has occurred, and is occurring. Average surface temperatures have increased by an estimated 1.4 degrees Fahrenheit between 1900 and 2005. Eleven of the last 12 years (1995-2006) rank among the 12 warmest years of global surface temperature[10] since 1850.[11] Other observations of observed climate change include:[12]

- The IPCC estimates that the total 20th Century sea level rise is 0.17 meters (.55 feet). They have "high confidence" that observed sea level has increased from the 19th to the 20th centuries;
- Average Arctic temperatures have increased at almost twice the global average rate in the past 100 years;
- Satellite data since 1978 shows that annual average Arctic sea ice extent has shrunk by 2.7 percent per decade;
- Temperatures in the Arctic permafrost layer (including areas of Alaska) have increased since the 1980s, and the maximum area covered by seasonally frozen ground has decreased by about 7 percent in the Northern Hemisphere since 1900;
- Precipitation changes have taken place including increased precipitation events in eastern sections of North and South America, northern Europe, and central Asia, and drying or drought events in the Sahel, the Mediterranean, southern Africa, and sections of south Asia;
- Increased frequency of heavy precipitation events over most land areas;
- Increased frequency of high-intensity (category 4 and 5) tropical cyclones (hurricanes) globally since 1970 as a function of increased sea surface temperatures among other factors.

The IPCC reports that:

> *Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land-use change, while those of methane and nitrous oxide are primarily due to agriculture.*[13]

The figures below are from the 2007 IPCC report and show the observed increases in greenhouse gases over time.[14]

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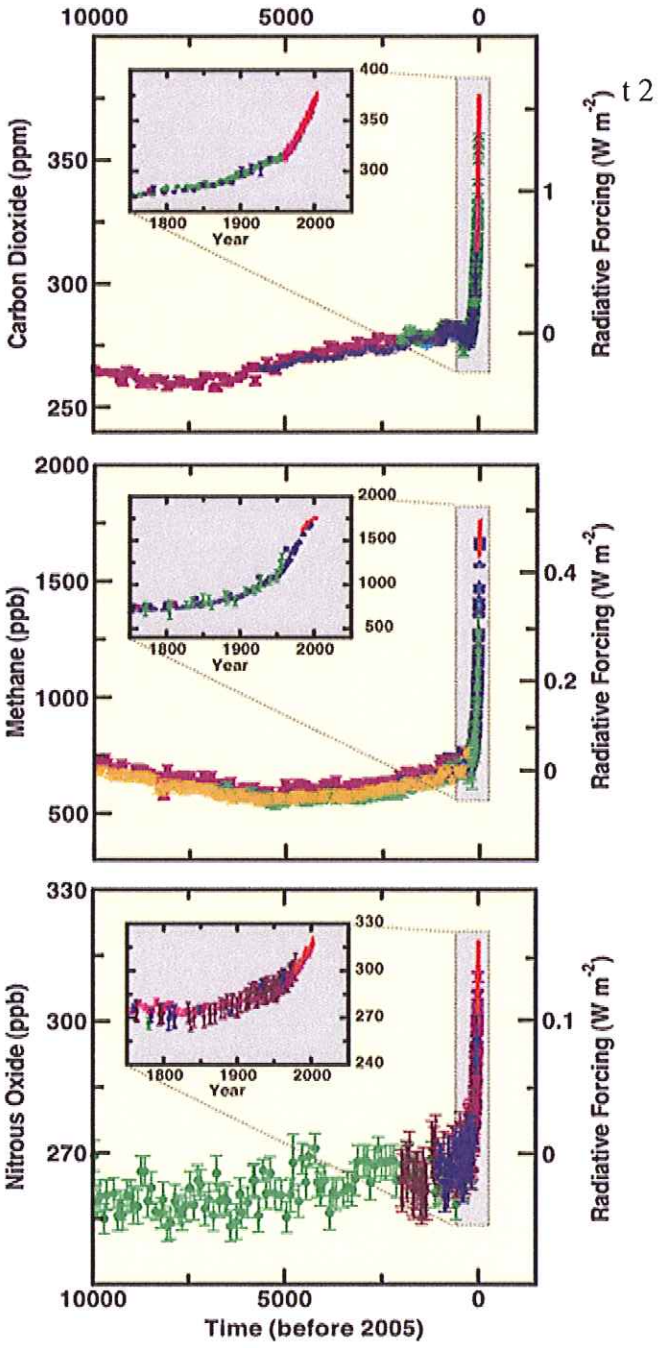
[10] The global surface temperature is the average of near surface air temperature over land, and sea surface temperature. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.5

[11] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.5

[12] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* pp.7-8; Emanuel, K.A. 2005. "Increasing Destructiveness of Tropical Cyclones Over the Past 30 Years." *Nature.* 436; 686-88; Webster, P.J., et al. 2005. "Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment, Science." *Science.* 309: 1844-46.

[13] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.2

[14] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.3



While a variety of greenhouse gases play a role in atmospheric warming, carbon dioxide is the most common and "the most important anthropogenic greenhouse gas." Prior to 1800, the beginning of the Industrial Revolution (when fossil fuels, such as coal, began to be used on a wide scale), there were roughly 280 parts per million (ppm) of CO_2 in the atmosphere.[15] In 2005, 379 ppm of CO_2 were measured in the atmosphere. This "concentration of carbon dioxide in 2005 exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined by ice cores." **As a result of these increasing levels, carbon dioxide is attributed to account for approximately 80 percent of all observed global warming.**

Other greenhouse gases do play an important part in observed global warming. Methane had a pre-industrial (pre-1800) value of around 715 ppb in the atmosphere. In 2005 it was measured at a level of 1,774 ppb. Methane is around 60 times more effective at capturing heat energy than CO_2. However, it lasts fewer years in the atmosphere than CO_2, and is produced in significantly lower amounts. It is estimated that methane will account for 15 to 17 percent of all global warming experienced this century. Nitrous oxide concentration has increased from a pre-1800 level of approximately 270 ppb to 319 ppb in 2005.

The IPCC projects that "continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would *very likely* be larger than those observed during the 20th century."[16]

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[15] Ppm (parts per million) or ppb (parts per billion) is the ratio of the number of greenhouse gas molecules to the total number of molecules of dry air.

[16] IPCC, February 2007. *Climate Change 2007: The Physical Science Basis – Summary for Policymakers.* p.13

Climate Change Impacts

The IPCC projects a number of environmental, ecosystem, and public health impacts will take place as a result of climate change.

For example, climate scientists hold that an increase in sea surface temperature – driven by climate change – will likely result in an increased frequency of higher intensity (categories 4 and 5) hurricanes.[17] While the deadly hurricane season of 2005 cannot be directly linked to changes in the earth's climate, it does echo these concerns. In just one storm, Hurricane Katrina, 1,118 people were confirmed dead, and 135 are still missing and presumed dead. Direct damage to residential and non-residential property is estimated at $21 billion. Damage to public infrastructure is estimated at another $6.7 billion. Almost one-half of the region's population that was affected by the storm has still not returned to their homes. And nearly 124,000 jobs were lost as a result of the hurricane.[18] The impacts of Hurricanes Katrina and Rita might be considered a harbinger of future economic and human impacts as a result of climate change.

Observed and anticipated impacts cited by the IPCC include:[19]

- Increased heat-related mortality has been observed in Europe;
- Disturbed forests due to increased incidences of fire and pests;
- Coastal flooding impacts due to sea level rise, and increased frequency and/or severity of storms;
- Average annual river runoff and water availability is projected to increase by 10-40 percent at high latitudes and in some wet tropical areas;
- Average annual river runoff and water availability is expected to decrease by 10-30 percent in some presently dry regions in the mid-latitudes, and in the dry tropics;
- Heavy precipitation events will increase in frequency, adding to flood risk;
- Water supply storage in glaciers and snow pack will decline. This decline is anticipated to reduce water availability in regions supplied by melting snow from major mountain ranges – home to one-sixth of the world's population;
- Approximately 20-30 percent of plant and animal species are likely to be at increased risk of extinction if global average temperature increases exceed 1.5-2.5 degrees Celsius;
- Acidification of the ocean due to increasing CO_2 is expected to have negative impacts on marine shell forming organisms (shellfish and corals) and their corresponding ecosystems;
- Crop productivity is projected to increase slightly in mid to high latitudes and spring planting seasons may begin earlier in some areas. Crop production is expected to decrease in the tropics; and
- Coastal wetlands will be negatively affected due to sea level rise, and decrease in sediment.

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[17] Emanuel, K.A. 2005. "Increasing Destructiveness of Tropical Cyclones Over the Past 30 Years." *Nature.* 436; 686-88; Webster, P.J., et al. 2005. "Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment, Science." *Science.* 309: 1844-46.

[18] American Society of Civil Engineers – Hurricane Katrina External Review Panel. 2007. *The New Orleans Hurricane Protection System: What Went Wrong and Why.*

[19] IPCC, April 2007. *Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability – Summary for Policymakers.* Pp.4-8